FAIRCHILD
A Schlumberger Company

IRF130-133/IRF530-533 T-39-11
MTP20N08/20N10 T-39-13
N-Channel Power MOSFETs, 20 A, 60-100 V

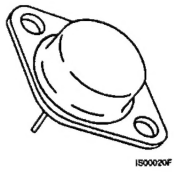
Power And Discrete Division

Description

These devices are n-channel, enhancement mode, power MOSFETs designed especially for high power, high speed applications, such as switching power supplies, UPS, AC and DC motor controls, relay and solenoid drivers and high energy pulse circuits.

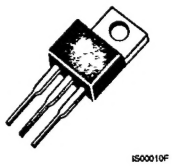
- **Low $R_{DS(on)}$**
- **V_{GS} Rated at ±20 V**
- **Silicon Gate for Fast Switching Speeds**
- **I_{DSS}, $V_{DS(on)}$, Specified at Elevated Temperature**
- **Rugged**
- **Low Drive Requirements**
- **Ease of Paralleling**

TO-204AA



IRF130
IRF131
IRF132
IRF133

TO-220AB



IRF530
IRF531
IRF532
IRF533
MTP20N08
MTP20N10

Product Summary

Part Number	V_{DSS}	$R_{DS(on)}$	I_D at T_C = 25°C	I_D at T_C = 100°C	Case Style
IRF130	100 V	0.18 Ω	14 A	9.0 A	TO-204AA
IRF131	60 V	0.18 Ω	14 A	9.0 A	
IRF132	100 V	0.25 Ω	12 A	8.0 A	
IRF133	60 V	0.25 Ω	12 A	8.0 A	
IRF530	100 V	0.18 Ω	14 A	9.0 A	TO-220AB
IRF531	60 V	0.18 Ω	14 A	9.0 A	
IRF532	100 V	0.25 Ω	12 A	8.0 A	
IRF533	60 V	0.25 Ω	12 A	8.0 A	
MTP20N08	80 V	0.15 Ω	20 A	11.5 A	
MTP20N10	100 V	0.15 Ω	20 A	11.5 A	

Notes
For information concerning connection diagram and package outline, refer to Section 7.

IRF130-133/IRF530-533
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Maximum Ratings

Symbol	Characteristic	Rating IRF130/132 IRF530/532 MTP20N10	Rating MTP20N08	Rating IRF131/133 IRF531/533	Unit
V_{DSS}	Drain to Source Voltage[1]	100	80	60	V
V_{DGR}	Drain to Gate Voltage[1] R_{GS} = 20 kΩ	100	80	60	V
V_{GS}	Gate to Source Voltage	±20	±20	±20	V
T_J, T_{stg}	Operating Junction and Storage Temperatures	−55 to +150	−55 to +150	−55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purposes, 1/8" From Case for 5 s	275	275	275	°C

Maximum Thermal Characteristics

		IRF130-133 IRF530-533	MTP20N08/10	
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.67	1.25	°C/W
P_D	Total Power Dissipation at T_C = 25°C	75	100	W
I_{DM}	Pulsed Drain Current[2]	60	60	A

Electrical Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
Off Characteristics					
$V_{(BR)DSS}$	Drain Source Breakdown Voltage[1] IRF130/132/530/532/ MTP20N10	100		V	V_{GS} = 0 V, I_D = 250 μA
	MTP20N08	80			
	IRF131/133/531/533	60			
I_{DSS}	Zero Gate Voltage Drain Current		250	μA	V_{DS} = Rated V_{DSS}, V_{GS} = 0 V
			1000	μA	V_{DS} = 0.8 x Rated V_{DSS}, V_{GS} = 0 V, T_C = 125°C
I_{GSS}	Gate-Body Leakage Current IRF130-133		±100	nA	V_{GS} = ±20 V, V_{DS} = 0 V
	IRF530-533/ MTP20N08/MTP20N10		±500		

IRF130-133/IRF530-533
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Electrical Characteristics (Cont.) (T_C = 25°C unless otherwise noted)

Symbol	Characteristic	Min	Max	Unit	Test Conditions
On Characteristics					
$V_{GS(th)}$	Gate Threshold Voltage			V	
	IRF130/133/530/533	2.0	4.0		I_D = 250 μA, V_{DS} = V_{GS}
	MTP20N08/20N10	2.0	4.5		I_D = 1 mA, V_{DS} = V_{GS}
$R_{DS(on)}$	Static Drain-Source On-Resistance[2]			Ω	V_{GS} = 10 V, I_D = 8.0 A
	IRF130/131/530/531		0.18		
	IRF132/133/532/533		0.25		
	MTP20N08/20N10		0.15		I_D = 10 A
$V_{DS(on)}$	Drain-Source On-Voltage[2]		1.5	V	V_{GS} = 10 V; I_D = 10 A
	MTP 20N08/20N10		3.6	V	V_{GS} = 10 V; I_D = 20 A
			3.0	V	V_{GS} = 10 V, I_D = 10 A T_C = 100°C
g_{fs}	Forward Transconductance	4.0		S (℧)	V_{DS} = 10 V, I_D = 8.0 A
Dynamic Characteristics					
C_{iss}	Input Capacitance		800	pF	V_{DS} = 25 V, V_{GS} = 0 V f = 1.0 MHz
C_{oss}	Output Capacitance		500	pF	
C_{rss}	Reverse Transfer Capacitance		150	pF	
Switching Characteristics (T_C = 25°C, *Figures 1, 2*)[3]					
$t_{d(on)}$	Turn-On Delay Time		30	ns	V_{DD} = 36 V, I_D = 8.0 A V_{GS} = 10 V, R_{GEN} = 15 Ω R_{GS} = 15 Ω
t_r	Rise Time		75	ns	
$t_{d(off)}$	Turn-Off Delay Time		40	ns	
t_f	Fall Time		45	ns	
$t_{d(on)}$	Turn-On Delay Time		50	ns	V_{DD} = 25 V, I_D = 10 A V_{GS} = 10 V, R_{GEN} = 50 Ω R_{GS} = 50 Ω
t_r	Rise Time		450	ns	
$t_{d(off)}$	Turn-Off Delay Time		100	ns	
t_f	Fall Time		200	ns	
Q_g	Total Gate Charge		30	nC	V_{GS} = 10 V, I_D = 18 A V_{DD} = 80 V

Electrical Characteristics (Cont.) (T_C = 25°C unless otherwise noted)

Symbol	Characteristic	Typ	Max	Unit	Test Conditions
Source-Drain Diode Characteristics					
V_{SD}	Diode Forward Voltage IRF130/131/530/531	1.5	2.5	V	I_S = 14 A; V_{GS} = 0 V
	IRF132/133/532/533	1.5	2.3	V	I_S = 12 A; V_{GS} = 0 V
t_{rr}	Reverse Recovery Time	300		ns	I_S = 4 A; dI_S/dt = 25 A/μS

Notes
1. T_J = +25°C to +150°C
2. Pulse width limited by T_J.
3. Switching time measurements performed on LEM TR-58 test equipment.

Typical Electrical Characteristics

Figure 1 Switching Test Circuit

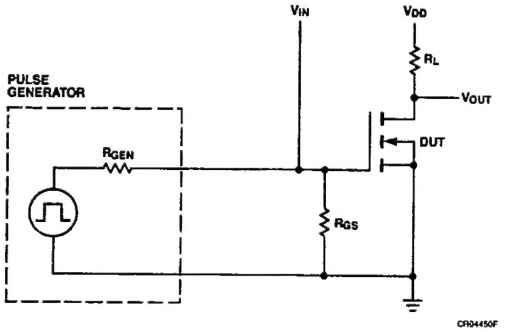
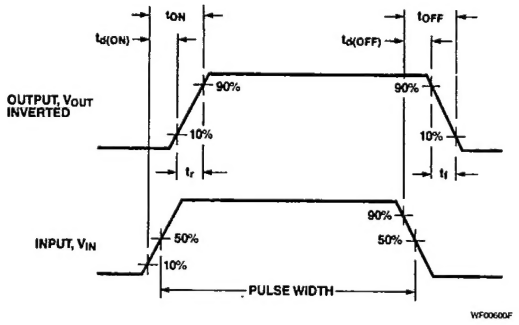


Figure 2 Switching Waveforms



Typical Performance Curves

Figure 3 Output Characteristics

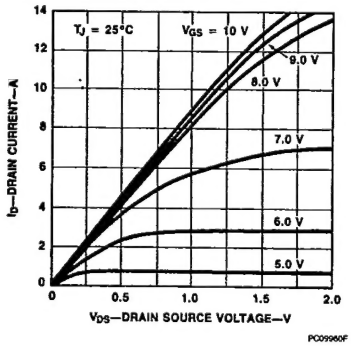
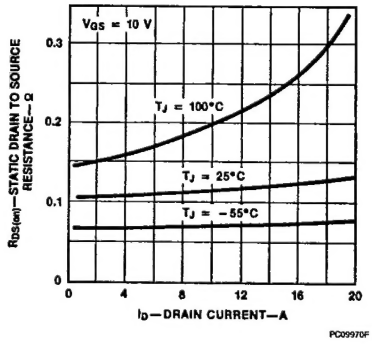


Figure 4 Static Drain to Source Resistance vs Drain Current



Typical Performance Curves (Cont.)

Figure 5 Transfer Characteristics

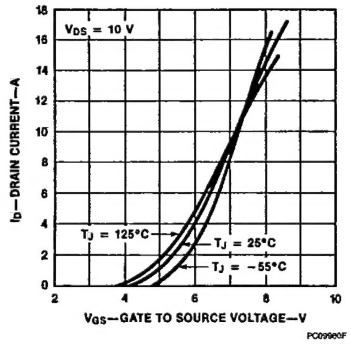


Figure 6 Temperature Variation of Gate to Source Threshold Voltage

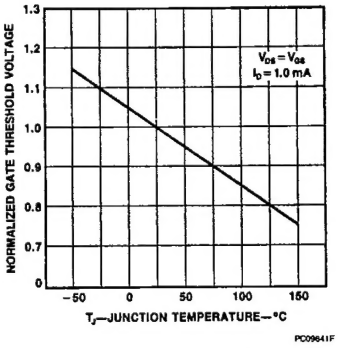


Figure 7 Capacitance vs Drain to Source Voltage

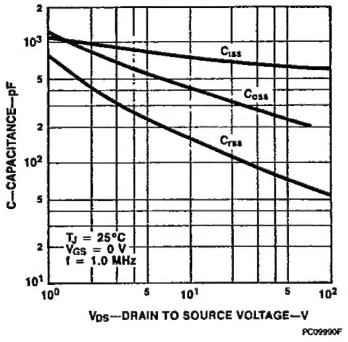


Figure 8 Gate to Source Voltage vs Total Gate Charge

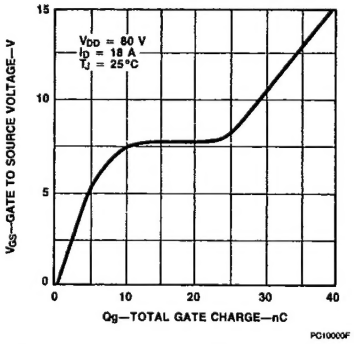


Figure 9 Forward Biased Safe Operating Area for IRF130-133 and IRF530-533

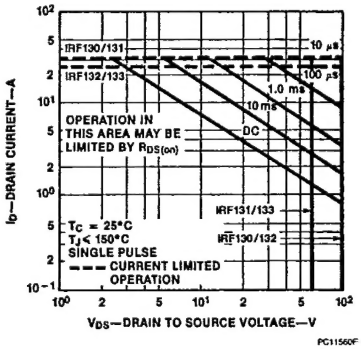
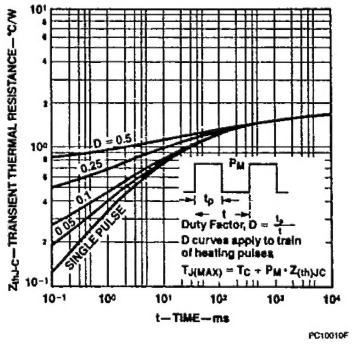


Figure 10 Transient Thermal Resistance vs Time for IRF130-133 and IRF530-533



Typical Performance Curves (Cont.)

Figure 11 Forward Biased Safe Operating Area for MTP20N08/20N10

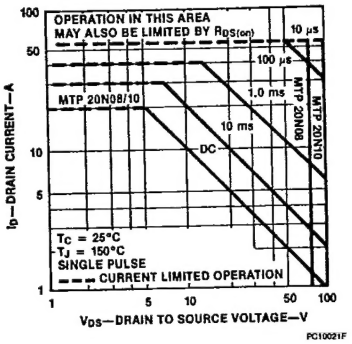


Figure 12 Transient Thermal Resistance vs Time for MTP20N08/20N10